

Landing Gear Noise Reduction Sub-Project (LGNR)

Completed Technology Project (2015 - 2019)



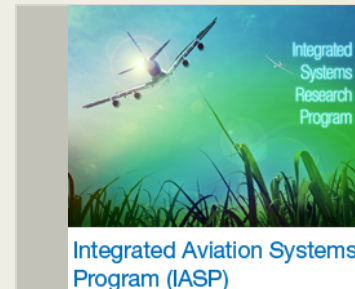
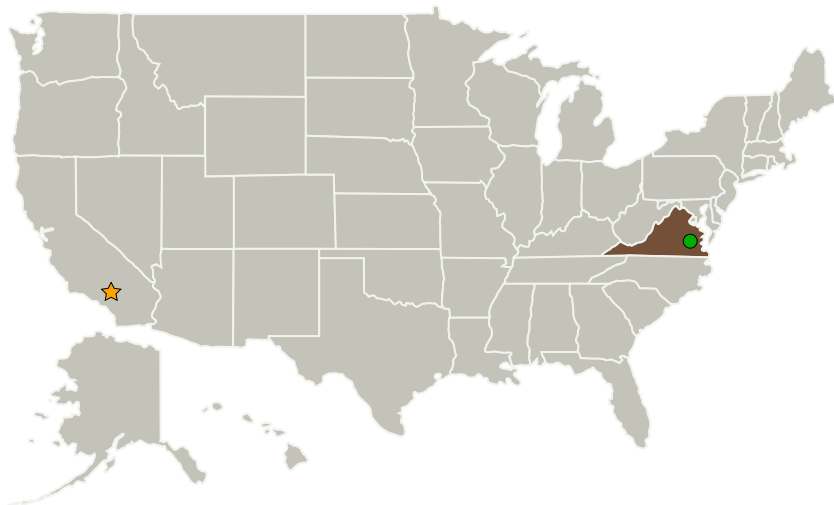
Project Introduction

NASA's aircraft noise reduction research is being demonstrated in the Landing Gear Noise Reduction (LGNR) Sub-Project under the Flight Demonstrations and Capabilities Project. Aircraft noise due to landing gear is an issue for communities situated near airports. NASA Aeronautics is developing ways to reduce landing gear noise impacts on the community. The Landing Gear Noise Reduction (LGNR) Sub-Project is an effort to demonstrate in flight the benefits of novel gear and wheel cavity treatments on reducing airframe noise as well as to verify and validate noise prediction tools and methodologies using flight test data.

Anticipated Benefits

The LGNR Sub-Project will demonstrate in flight landing gear porous fairing and wheel cavity treatments that reduce the airframe component of community noise associated with the main landing gear (MLG) on a G-III aircraft. The Sub-Project will also validate an advanced, physics-based methodology for the accurate prediction of airframe noise to facilitate future noise reduction research. During flight testing, the acoustic signature benefits of the Adaptive Compliant Trailing Edge (ACTE) technology will also be assessed. Through demonstrating and promulgating the benefits of airframe noise reduction treatments, as well as an advanced methodology for accurate airframe noise prediction, the LGNR Sub-Project will inform future airframe designs to enable quieter operations.

Primary U.S. Work Locations and Key Partners



Landing Gear Noise Reduction Sub-Project

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Organizations Performing Work	Role	Type	Location
★ Armstrong Flight Research Center (AFRC)	Lead Organization	NASA Center	Edwards, California
Air Force Research Laboratory (AFRL)	Supporting Organization	US Government	Notre Dame, Indiana
Aviation Partners FlexSys	Supporting Organization	Industry	
● Langley Research Center (LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Virginia

Project Transitions

▶ **October 2015:** Project Start

✓ **September 2019:** Closed out

Closeout Summary: The Acoustic Research Measurements (ARM) flights, conducted under the NASA Flight Demonstrations and Measurements (FDC) project, were designed to evaluate technologies that substantially reduce airframe noise generated by aircraft landing gear. The technologies, which consisted of main landing gear fairings and two gear cavity treatments, were developed in phases that comprised high-fidelity, large-scale unsteady simulations; optimization of fairing performance via computations; and full-scale flight tests. For the latter, the noise reduction concepts were integrated into a NASA Gulfstream G-III aircraft to determine their effectiveness, both on a component-level (individually) and a system-level (combined) basis in a relevant flight environment. With the aircraft flying an approach path and engines at "ground-idle," extensive acoustic measurements were acquired with a phased microphone array system. Thorough analyses of the gathered acoustic data demonstrated that significant reduction in noise levels was obtained for the landing gear component, thus achieving a TRL of 6 for the tested technologies and exceeding the level set for the Landing Gear Community Noise Tech Challenge.

Organizational Responsibility

Responsible Mission Directorate:

Aeronautics Research Mission Directorate (ARMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Integrated Aviation Systems Program

Project Management

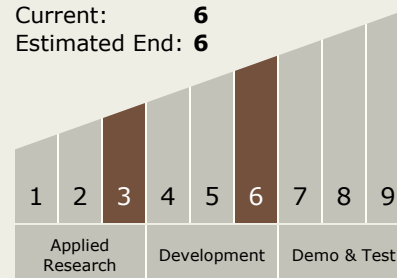
Program Director:

Richard L Noble

Project Managers:Brent R Cobleigh
Kevin C Weinert

Technology Maturity (TRL)

Start: 3
Current: 6
Estimated End: 6





Project Website:

<https://www.nasa.gov/aeroresearch/programs/iasp/fdc>

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.4 Aeroacoustics

Target Destination

Earth